**Appendix**

**For full Discussion, kindly refer to:**

Olorogun, L. A. (2015),"A proposed contribution model for general Islamic insurance industry", *International Journal of Islamic and Middle Eastern Finance and Management, Vol. 8( 1).* pp. 114 – 131.

[…..] premium quotation is only concerned with the expected liabilities of the insurer without consideration of the returns on the funds which the insurer accumulated through investment or unclaimed premiums. Based on this premise and other reasons, the conventional insurance industry was criticized by scholars of Islamic finance and conventional financial experts such as Briys and De Varenne (2001).

 The Islamic insurance operator accumulates funds from participant contributions which usually exceed the expected claims $E\left(S\right).$ The Islamic insurance operator, on the other hand, is expected to return this excess to the participants by incorporating it into the underwriting returns $(U\_{R})$$(U\_{R})$. This, it is assumed, renders the Islamic insurance policy premium to be equitable and justified. This excess fund is technically known as underwriting returns.

For this research the underwriting returns are denoted as $U\_{R}$

where

 $U=$ Underwriting

$R=$ Return

 This model does not consider the method or process of generating the funds whether through investment or otherwise.[[1]](#footnote-1) However, it is hypothesized that the Islamic insurance operator does not exhaust the fund within a stipulated period, for example one calendar year.

 The total of the accumulated fund is assumed as fixed, i.e. the insurer does not accept further contributions at a particular time except that which is generated at a rate at the stipulated time:

$A\_{0}=f\left(t\right)or A(t)$

$A\_{0}$ is the total amount accumulated $A(0)$ by the Islamic insurance operator at a certain period. In other words, there occurs no further influx into the fund. The reason for holding the fund fixed after a certain period of accumulation is to avoid the inaccurate derivation of underwriting return.

$f\left(t\right)/A(t) $is the function of time of the accumulated fund

where

$t=$ time, in the current discussion the period of Islamic insurance which can be monthly, quarterly or yearly.

Therefore, the rate of accumulation between

$t\_{i},t\_{i+1 }…….t\_{i+n}≈f(t\_{i})∆t$……………………..(2)

$∆$ is delta which means the rate of change in the accumulation of fund over time. This means there is change in the amount accumulated from the beginning of the period of accumulation to the end of the stipulated period when the fund is fixed.

 It is further assumed that there will be claims presented to the Islamic insurance operator and successfully honoured which are denoted as (S). These successful claims paid out by the Islamic insurance operator from the point of time $t=0$ to the point of time $t\_{n}$ are as shown in equation 3[[2]](#footnote-2) below:

$S=e^{-st}$………………………………………(3)

where

$$S is the claims presented to the Islamic insurance operators.$$

$s=$ Variable of claims paid out which depends on the rate of presentation of claim at a time during the policy term.

$t=$ Point of time at which claims are presented.

**The problem:** Between the initial point of time i.e. t = 0 when the fund is at $A\_{0}$ to the point of time $t\_{n}.$, what is the amount left in the Islamic insurance operator’s fund?

 The amount remaining in the fund can be derived through the convolution of the accumulated fund and the claims paid out at a point in time during the period of the policy formulated as:

$f\left(t\_{i}\right)∆t\*e^{-st}=U\_{R}$……………………………..(4)

or

 $A\_{0}\*S=U\_{R}$

***The New Proposed Optimal Islamic Insurance pricing Model is***

$$C=E\left(S\right)+K+R-U\_{R}$$

**Where:**

$C=$ Contribution

$E\left(S\right)$ = Expected claim

$K=$ Running cost

$R=$ Risk premium

$U\_{R}=$ Underwriting return

1. Property and pecuniary insurance policies are usually based on yearly contracts. Similarly, Islamic insurance for property covers are annually renewable contracts. The operators require cash or liquidity throughout the year in order to meet-up with payment of claims as it falls due. Thus, most of the funds for these classes of insurance are expected to be available in cash. However, in practice managers of funds tends to re-invest these funds in equity (risky asset) or bonds (risk-free asset) or both which can easily be converted back into cash when required. This practice is described in the Black-Scholes model where a risk-free asset is denoted by $(β\_{t})$$(β\_{t})$ and risky asset $(S\_{t})$$(S\_{t})$. For more detail kindly see P. Azcue and N. Muler, “Optimal investment policy and dividend payment policy in an insurance company”, in *Annuals of Applied Probability* 20/4 (2010), 1253-1302. [↑](#footnote-ref-1)
2. On the right hand side of this equation appears the exponential decay function. Mathematicians and engineers employ exponential functions to determine the amount of toxic content in an environment, the growth of bacterial cultures, etc. Exponential functions are functions of t (time) are measured from the starting point. Exponential growth functions are used in measuring monetary growth aspects of credit cards, bank accounts, car and home loans, etc. An exponential decay function is employed to determine the consistent rate at which an original amount will be reduced over a period of time, such as reduction of toxins. The base of an exponential function *b* is a positive real number other than 1 i.e. b>1 and b≠1. Thus, the domain of exponential function contains all real numbers. However, if the base is greater than 1 (b>1) the function is that of exponential growth. If, on the other hand, the base is less than 1 (b<1) the function is that of exponential decay. [↑](#footnote-ref-2)